FRANCE
ENERGY PROFILE

February 2002

I. Statistical information

Primary energy consumption

2000	Ktoe	%
Coal	14000	5.4
Petroleum	99.000	38.3
Natural Gas	37.000	14.3
Nuclear	95.000	36.8
Wind/Solar	12.000	4.6
Total	258,000	100

Official figures for 2001 have not yet been released. However, estimations indicate that total consumption of primary energy has increased by 2.7%.

II. Evaluation of sector

Electrical power systems, Oil and Gas field machinery and services

A) On a scale of 1 (low) to 5 (high), evaluate the priority given by the host government to energy development: 5

B) On a scale of 1 (low) to 5 (high), evaluate country's receptivity to U.S. products and services: 3

C) On a scale of 1 (heavy) to 5 (little), evaluate competition for U.S. exporters from local domestic suppliers: 1

D) On a scale of 1 (heavy) to 5 (little), evaluate competition for U.S. exporters from third-country suppliers: 1

E) On a scale of 1 (severe) to 5 (little), evaluate overall effect of trade barriers on U.S. exports of products and services: 3

III. Summary

As a result of the oil crisis of 1973, and in order to ensure national energy independence, France launched an extensive nuclear power plant construction program in the mid seventies. Today, France is the world's largest nuclear power producer on a per capita basis, and boasts the world's second largest total installed nuclear power capacity, as roughly seventy-five percent of French electricity is generated by nuclear power.

Furthermore, a watershed 1997 European Union (EU) directive has paved the way to wide-scale liberalization of national energy markets. Namely, EU member countries must consent to the liberalization of 26 percent of their energy markets beginning in 1999. In addition, this legislation stipulates that member countries must liberalize 33 percent of their supply markets by 2003. According to the International Energy Agency, France's state-owned monopoly Electricité de France (EDF) will maintain a strong competitive advantage even after liberalization, effectively limiting wide-scale competition from outside suppliers in the short term. EDF will remain in control of France's transmission grid and will also continue to plan the future of France's generating capacity; essentially retaining its status as a public service provider. EDF being the biggest World Company in the Business is trying actually to become a European major institution (although Brussels is fighting against that) by investing in big energy suppliers such as Montedison in Italy. We may think that after the presidential election in may, the privatization of EDF will come to the surface.

France is currently suffering from enormous over-capacity in the nuclear energy sector and, as a result, no new nuclear power plants (NPP) are scheduled to be built in France until 2020, at the earliest. EDF plans to extend the life of existing nuclear plants for another 20 to 30 years, which it believes will be more cost-effective than building new facilities.

Market opportunities for U.S. energy service providers exist in the nuclear power sector, particularly with regard to maintaining, improving, and extending the safety and reliability of existing power plants. Other market opportunities include nuclear equipment and services - particularly uranium enrichment and spent fuel reprocessing - and managing nuclear waste disposal in general. Due to recent tightening in EU environmental policies, the gas market should be attractive to companies specializing in environmentally-sound and high-productivity equipment. Furthermore, there is market demand in the oil industry for equipment used in all aspects of the refining process, including the engineering behind extraction and refining plants.

In adherence with the recent European Directive covering the generation of electricity from renewable sources, France is to increase electricity production from these sources from 15% (currently most hydro) to 21% by 2010, which translates into additional energy production of 40TWh (terawatt hours). To achieve this, France will focus on developing essentially its wind energy capacity. In 2000, France produced 27,522 Ktoes of energy from renewable sources. Overall, France is already Europe's largest producer of renewable energy, with over 20% of total European production.

IV. Market Overview

Total consumption of primary energy, after climate correction, reached 257.6 Mtoe (million tons of oil equivalent) in 2000, with an estimated 2.7% increase expected for 2001 (final figures not yet released). The residential-tertiary sector was the largest consumer of energy, consuming 46.6 percent of total energy, followed by the industrial sector 26.8 percent (metal working representing 3.5 percent), transportation 24.9 percent and agriculture 1.57 percent. Since the oil shock in 1973, France has been working to reduce its energy dependence on outside sources. In 2000, France produced 126 Mtoe, or 48.9 percent of its total energy consumption. Production included 2 Mtoe of coal, 2 Mtoe of petroleum, 2 Mtoe of natural gas, 92 Mtoe of nuclear energy, 16 Mtoe of hydroelectric energy, and 12 Mtoe of renewable energy.

Although France has increased its energy production capabilities over the years, it still heavily imports energy from outside sources. The level of imports in 2000 is increasing as compared to 1999, with France importing a total of 165.4 Mtoe of energy. Most notably, France imported about 82 Mtoe of crude oil and about 28 Mtoe of refined oil, as well as 96% of the natural gas it consumes.

The French energy industry is in the process of undergoing some substantial changes, especially in terms of gas and electricity, which are considered to be the most profitable energy sources of the future. The gas and electricity sectors previously dominated by the state owned companies, Gaz de France (GDF) and Electricite de France, are in the initial stages of implementing the European Union Directives calling for the liberalization of the energy market. In addition, a number of changes have been effected in France in response to the Kyoto Protocol drafted in 1997, which called for stabilization of CO2 emissions to their 1990 levels. The National Program for the Fight against Climate Change, started in January of 2000, seeks to stabilize carbon-dioxide levels in France by the year 2010. The appropriate emissions levels have been determined by sector, and new projects have been proposed for each energy sector in order to achieve the emissions goals, including a unprecedented environmental (carbon) taxation.

NUCLEAR

Nuclear energy comprises the majority of France's energy production. France boasts the largest, most integrated system of nuclear power plants in the world, owned and operated by Electricité de France. In 2001, France's 58 nuclear power plants provided an estimated 76.2 percent of the country's total electricity production, or 415 TWh in 2000. Current plant capacity in France has surpassed domestic needs, allowing 72.6 TWh of electricity to be exported to neighboring countries in Europe.

The most recently built nuclear power plant was connected to the national energy grid in 1999. The life of the majority of current existing nuclear plants will begin to end around the year 2020. Instead of building new plants, the French government seems to be retreating from the strong pro-nuclear position it held in the past. Attention will be focused on maintenance and on ensuring the safe and reliable operation of existing plants. The French government is expecting to reduce nuclear generation from the current 76.2 percent to less than 70 percent by 2010. It is anticipating the power generation percentage to drop to 57 percent by 2020.

Nuclear safety is an extremely important issue to the government and the citizens of France. Overall, since the launch of the extensive nuclear power plant program, the safety record of nuclear power in France has been very good. Currently the French government would like to initiate new institutional and legal measures to improve transparency and accountability for safety regulation.

GAS

Former French natural gas monopoly, Gaz de France (GDF), is establishing France as a hub for Western European natural gas. The NorFra pipeline, which was completed in 1998, has linked Norway's Troll gas field with the expanding French natural gas grid. It is projected that by the year 2005 the NorFra pipeline will be supplying France with one third of its natural gas consumption.

In 2000, natural gas represented 14 % (37 Mtoe) of primary energy consumption, an increase of 3.8 percent over 1998. French gas production has been falling steadily for the past years.

In 2000, GDF provided 95 percent of the natural gas distributed in France, the majority of which was imported from Norway (NorFra pipeline), Russia, and Algeria. In 2000, gas represented 14.8% of all energy imports.

OIL

Overall, the French oil refining industry finds itself in a somewhat precarious position, characterized by an excessive demand for diesel fuel versus the demand for gasoline, largely the result of differing tax rates for the two fuels. The thirteen French oil refineries have a refining capacity of 96.2 million metric tons. However, the volume of crude oil treated in 2000 was only 83.4 million metric tons, a drop of 9.2 percent from 1998. Decline in production of refined petroleum products is due to periodic closures of 8 of the 13 refineries for renovations, to comply with EU standards, as well as to the rise in the price of crude oil.

Since the oil crisis in the early 1970s, oil has lost significant market share to nuclear power. Long term displacement of oil has occurred in the industrial, domestic and power generating sectors. In fact, national production now only represents approximately 2% of national consumption. However, the transport sector remains completely dependent on oil due to the lack of any viable alternative energy source; oil represents 95.3% of the transport sector's final energy consumption. In 2000, the transport sector consumed 51.6 Mtoe of oil, some 53% of the total oil consumed in France, and an 2 Mtoe consumption increase over 1998. Overall, domestic demand for petroleum is likely to continue its upward trend over the next few years in line with the expected sustained need of the transport sector.

About 1.9 million barrels per day of France's approximate 2 million barrels consumed are imported. French imports of oil come primarily from Saudi Arabia (18.4%), Norway (18.2%), the United Kingdom (15.8%), Iraq (8.9%), and Iran (8.3%).

RENEWABLE ENERGY

France has made a strong commitment to develop and expand the use of renewable energies in the production of electricity. Driven by its commitment to the Kyoto Protocol, France seeks to double the amount of renewable energies in the primary energy consumption, as well as increase the amount of electricity generated by renewable energies from 15% (1997) to 21%, all by the year 2010.

Hydro-generated power represents the second largest means of electricity production in France. At 77,500 GWh, hydro-electricity production also makes France the largest producer in Europe of electricity from renewable energies. Hydroelectric production capacity is forecasted to grow by 1000 MW by the year 2010, mainly in the forms of new installations, and the rehabilitation and improvement of aging installations. The only obstacle to this growth is the classification of certain rivers given by the Superior Counsel of Fishing.

One of the biggest projects dedicated to the increased importance of renewable energies is EOLE 2005, founded in 1996. This project seeks to increase the production capacity of windmills to 250-500 MW by 2005. In addition, the National Program for the Fight against Climatic Change has stated a capacity goal of 3000 MW by 2010. France has the second largest windmill-generated energy potential in Europe, with 70 TWh potential on shore and 90 TWh off shore. TotalFinaElf is currently developing the BREEDT off-shore wind power project (northern France), to create a 40 unit wind farm by 2003/4. Shell has begun a study for another off-shore farm of 40 units, offering a combined power of 100 MW.

In July of 2000, EDF opened its high-powered 750 kW Widehem wind farm in the Nord-Pas-de-Calais region in northern France. In the future, this wind farm will produce 12.6 million KWh per year. This new installation joined EDF's other wind powered facilities, including a 50 MW installation in the Tetouan region of Morocco and a hybrid electricity production facility (wind and solar power) on the Glénan islands off the western coast of France.

The use of solar energy was not a main priority of the state until 1996, but now France has begun to explore its possibilities, especially in the departments outside of mainland France. The program "Sun Plan," started in 1999, calls for the installation in metropolitan France of 15,000 solar water heaters and 500 solar heating systems, per year, by 2006. The government has also stated an objective of using 250,000 m2 of solar generating capacity per year by 2006, and 500,000 m2 per year by 2008.

Remaining renewable energy sources such as biofuels, tidal power and photovoltaic generation are not widely used in France, although research and development for future uses continues. Biofuels, an alternative fuel source, are mainly used by EDF, which has five projects that utilize the energy source with a resulting capacity of 12.9 MW. Another program has been established in France that integrates the installation of photovoltaic roofs into new construction, with an aim for a generating capacity of 300 MW over ten years.

COGENERATION

As a result of its commitment to reduce carbon-dioxide levels, France continues to develop its cogeneration sector. Currently, the main incentive for cogeneration is derived from a law requiring EDF to favorably price cogenerated power. As of January 1, 1997, EDF must purchase cogenerated electricity offered by private producers. EDF has agreed to buy cogenerated electricity at a set price for a twelve-year period. In 1999, the purchase contract was reviewed with new conditions of remuneration being implemented. This purchasing agreement should ensure against fluctuations in gas prices.

Cogetherm, the cogeneration subsidiary created by EDF in coordination with GDF, has continued to exploit energy produced by cogeneration. Since 1997, when the first cogeneration plant was built, the subsidiary has entered into eight contracts, often in partnership with other investors or producers of heat. These contracts have resulted in a total installed power of 250 MWe.

Estimated at $215 million, the French market for cogeneration systems is not large, especially when compared with Germany and Scandinavia, but it is expected to grow. The majority of cogeneration installations are gas-fired CHP, and installed cogeneration capacity should triple within five years, creating new market openings for industrial consumption of natural gas.

Continuing their commitment to pool their expertise in new power generation technologies, Total and EDF signed a preliminary agreement on May 28, 1999, for a cogeneration project in Dunkirk. The project will be integrated into Total's refinery in Flanders and will use refinery gases and additional natural gas to produce steam for refining units, as well as some 100-150 MW of electricity. The energy efficient project will create a 25 percent reduction in overall energy consumption and reduce emission gases. It is expected to be operational in 2002. This commitment follows a previous project between the two companies, announced in 1998, to build a large Integrated Gasification Combined Cycle (IGCC) plant at Total's Normandy refinery.

BEST SALES PROSPECTS

Nuclear

Due to the absence of new power plant construction in France, the power generation industry is mostly a maintenance- and service-driven market. The present prospects for American companies lie in predictive maintenance, especially in the fields of diagnostics, monitoring, software, and process controls instrumentation. Management waste and exporting nuclear equipment and services, including uranium enrichment and spent fuel reprocessing, should be considered attractive markets for American corporations. Improvements of the power transmission and distribution networks are also planned, which includes network upgrades and modifications, the installation of lines to new and existing customers, and other activities related to the installation or upgrading of the current energy network.

Gas

Natural gas distribution shows market potential for U.S. firms with innovative and low-cost technologies. Since the cost of transporting natural gas can be exceedingly high - and European natural gas providers like Gasprom have longstanding contracts with GDF - American companies should concentrate their efforts on the distribution of the final product to the consumer.

The EU plans to tighten environmental controls on the European gas market by increasing the role of catalyzers in the refining process. As such, U.S. companies with past experience in environmentally sound and high productivity equipment have significant potential in this market.

A current project includes the MEDGAZ pipeline to route Algerian gas to Europe (via Spain to France). Total Fina Elf and Gaz de France are implicated in this project along with Italy's natural gas company, E.N.I, Algeria's Sonatrach and Spain's CEPSA. Production will rise from 50,000 barrels /day of natural gas to 120,000 barrels /day by the end of 2003.

Oil

Since the majority of the activity in the French oil industry involves refining, a strong demand exists for equipment used in all aspects of the refining process, including the engineering behind extraction/refining plants. On the other hand, the small demand for exploration and production equipment reflects the minor roles these two activities play in France.

Cogeneration

With measures for the liberalization of the energy market being implemented, future changes in EDF's current monopoly will lead to greater market opportunities for American suppliers of cogeneration units. As the market opens up to new players, U.S. firms will be in a better position to offer equipment and services to a variety of companies. Overall, strongest demand will come from waste burning and incineration plants, due to stricter environmental controls. Airports and hospitals presently have a strong need for cogeneration capacity.

COMPETITION

Electricity Generation

The new Electricity Act deregulates the French market close to the minimum thresholds required by the European directive. State-owned EDF owns a dominant position in the market and holds a large incumbent advantage, while also being very active internationally. It still remains to be seen if any competition will arise under the new Electricity Act.

Even though the French government has been slow in its liberalization of the electricity market - which has largely been perceived as an effort to protect state-owned EDF - it is beginning to make some concessions. For example, the EU recently allowed EDF to acquire a 25 percent stake in German utility EnBW, and in return, EDF agreed to make 6000 MW available to

competition. Nevertheless, state-owned EDF might privatize some of its assets after the Presidential Election next May.

The nuclear maintenance industry in France employs approximately 30,000 people, 10,000 by EDF and the other 20,000 by subcontractors. The market is highly-specialized, with close to 600 small subcontractors concentrating on a single specialized service area. Framatome, which is the designer and installer of nuclear power plants for EDF, is EDF's main partner for heavy nuclear services. Most French maintenance demand is met by domestic companies, leaving little room for outside competition. Westinghouse and General Electric are the main US maintenance servicing companies operating in France. Interestingly, the first French nuclear power plant was built under a Westinghouse license by Framatome, using the U.S. firm's plant design and production layout.

Eighty percent of nuclear reprocessing is conducted by the group COGEMA. COGEMA reprocesses French as well as European and Japanese nuclear waste.

Gas

Gaz de France (GDF) holds the monopoly on the transportation, storage, processing and distribution of gas in France. GDF's business operations represent nearly the entire French market for natural gas, although the market is gradually opening to private companies due to the Gas Directive adopted by the EU in 1998. The Gas Directive, which was applicable in France beginning in 2000, grants eligible customers the right to obtain their natural gas from suppliers of their choice. These independent suppliers may access GDF's gas transmission and distribution networks, as well as the liquefied gas facilities, after entering into a one-year long transportation contract with GDF. GDF has prepared for liberalization by augmenting its transmission and storage capabilities, as well as its ability to receive and manage liquefied natural gas. In compliance with the EU directive, GDF will provide exchange and transit services over its own network for various European companies by the year 2003.

In support of the liberalization of the French gas market, four French companies (Rhodia, Saint Gobain, Pechiney, and Solvay) joined forces in 2000 to encourage international bidding for the rights to be a gas provider to 19 industrial plants. These 19 plants represent 5 percent of the total French natural gas market.

Three entities other than GDF operate transmission systems in France -- Gaz du Sud-Ouest, Compagnie Française du Méthane, and Société Elf Aquitaine de Réseau.

Oil

Recent mergers over the past two years have resulted in the creation of France's largest industrial group and of the fourth largest petroleum company worldwide. On March 26, 1999, the European Union Commission approved the merger between Total and the Belgian company Petrofina on the basis that Total would sell its minority interests in two oil storage depots in northern France. Less than a year later, on February 9, 2000, the EU Commission approved the merger between TotalFina and Elf Aquitaine, creating the new entity TotalFinaElf.

In order to maintain competition in specific markets, certain transactions were demanded from the new company. As a result, 70 service stations located along French highways will be sold and divided between the group's two trade names; all or part of the two companies' interests in three oil pipelines (Trapil, SPMR, DMM) and in 17 refined product storage depots will be sold; Elf Antargaz and Elf Aquitaine's associated LPG logistical assets in France will be sold; and half of the supply infrastructure for the Lyon and Toulouse airports will be opened to third parties. The creation of TotalFinaElf came just before agreements governing relations between Total and the French Government expired, marking the end of obligations between the formerly state-owned company and the government.

THIRD COUNTRY IMPORTS

Ninety percent of French maintenance demand is handled by domestic suppliers, leaving little room for foreign service providers. Most foreign service providers provide maintenance of automation systems, including electric components, instrumentation, and process controls. Currently American companies hold around 8 percent of the maintenance market in France. The US market share is expected to increase in future years in line with projected growing market demand for predictive maintenance equipment. Westinghouse and General Electric are two US-based companies that have successfully obtained significant market share in the maintenance market due to their longstanding presence in France.

Since France is not highly endowed with natural resources, natural gas and oil imports are critical. France is a net energy importer. France imports an estimated 2 million barrels per day (bdp) of oil each year. Oil imports are historically imported from Saudi Arabia, Norway, UK, Iraq and Iran as well as from French oil company assets located in the North Sea and Africa.

An estimated 1.3 Tcf of natural gas is imported into France each year. Norway is France's top natural gas import supplier, followed by Russia and Algeria. In addition, the Gaz de France, supplies about one fifth of France's natural gas consumption from its holdings in France and abroad. New pipeline construction is beneficial to France's energy infrastructure, making it easier to import and distribute natural gas supplies.

Major Procurements on the Horizon

France has no plans to construct new power plants in the near future. Consequently, demand will be primarily for replacement parts, maintenance and upgrades to electrical power systems. Small and medium-sized American companies interested in evaluating the potential of their products in the French energy market should consider contacting the French national power plants. Each national power plant in France conducts its own on-site maintenance through its maintenance department, which is responsible for all the operations carried out on industrial equipment.

Country's Methods of Procurement

For French public utilities, the sophisticated installation of electrical power systems or gas and oil equipment is usually procured by inviting qualified companies to bid. EDF and GDF's calls

for bids are in line with the mandatory EU framework for procurement. Preferential treatment is often given to bids using local manufacturers. EDF or GDF officials do not appear to be protectionist with regard to using American suppliers of electrical equipment.

EDF officials state that the ideal situation for American suppliers to gain French market share would be by cooperating with them on international projects from the beginning of those projects. Some American suppliers of highly specialized equipment and services have succeeded in entering joint venture agreements with EDF in this manner.

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GIMILEC
17, rue Hamelin
75783 Paris Cedex 16
Tel: (33) 1 45 05 71 32 Fax: (33) 1 45 05 72 40
This is the French electrical materials and equipment association.

Comité de Liaison Energies Renouvelables(CLER)\
28, rue Jules-Ferry
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Tel: (33) 1 55 86 80 00
This is France's renewable energy liaison committee.

Trade Events

ELEC 2002
December 9-13, 2002
Paris, France
Elec Promotion
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ELEC is France's premier electricity and electric equipment event.

Assistance to U.S. companies

The U.S. Commercial Service office at the U.S. Embassy in Paris can assist American companies with a wide range of services to assist them in the French energy market. These include market research, partner identification and contact lists, and single company promotions, among others.

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